

Comments on: The Properties of Variances

It is clear what the author is trying to do in this paper. And, this effort is appreciated. We should always question whether the application of a geostatistical estimator for spatial prediction is yielding statistically significant results. However, the author fails to make a valid comparison in this paper. The author also acknowledges his disappointment with reviews he has received in the past, particularly in how vague these reviews were; therefore, I will try to present very clear statements regarding my criticisms.

1. when using weighted average estimation for spatial prediction, the variance of interest is that for the error of prediction. The development of the error variance expression in kriging, for instance, is solidly founded in [Carl] Gauss' theory of errors. The equation the author presents for the variance of the weighted average, even if valid, is not relevant to the problem at hand. Moreover, this reviewer had considerable trouble understanding how the author derived the variance values of 4216, for Table 2, and 1983, for Table 3.

Given that the more important measure of variance is that for prediction error, it would be a useful exercise for the author to compare the error variance for simple averaging to that for kriging (weighted averaging).

2. the author seems to be quite concerned with degrees of freedom, and further suggests that geostatistics is either unconcerned with the concept of degrees of freedom, or ignores the concept entirely. Neither of these implications is correct. Geostatistics need obey the concept of degrees of freedom no more so than linear, least squares regression analysis. Implicitly, the kriging estimator, a weighted average, is based on N degrees of freedom, where N is the number of nearest neighbors used for estimation. However, it is not particularly relevant in kriging to ever formally state this to be the case. With respect to estimation [error] variance, degrees of freedom are an implicit aspect of the calculation, but it is not necessary to know this or state this explicitly; the expression in kriging for error variance is theoretical and firmly founded in Gauss' theory of errors (see Carr, J.R., 1995, Numerical Analysis for the Geological Sciences, Prentice-Hall, Chapter 6).

3. if the author were to try to compare kriging to some other estimator, and to make this comparison by using statistical hypothesis testing, then degrees of freedom become very important; the author seems not to be aware of Mathematical Geology, Vol. 21, No. 2, 1989, pp. 255-266.